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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
09/671,802	09/28/2000	Jozef M. Finders	PM 0273961	7922

909 7590 05/02/2003
PILLSBURY WINTHROP, LLP
P.O. BOX 10500
MCLEAN, VA 22102

EXAMINER

CHACKO DAVIS, DABORAH

ART UNIT	PAPER NUMBER
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1756

DATE MAILED: 05/02/2003

12

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary

Application No.

09/671,802

Applicant(s)

FINDERS ET AL.

Examiner

Daborah Chacko-Davis

Art Unit

1756

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133).
- Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 31 March 2003.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-23 is/are pending in the application.
- 4a) Of the above claim(s) 18-22 is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 1-17 and 23 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on _____ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.
- Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
- 11) ☐ The proposed drawing correction filed on _____ is: a) ☐ approved b) ☐ disapproved by the Examiner.
- If approved, corrected drawings are required in reply to this Office action.
- 12) ☐ The oath or declaration is objected to by the Examiner.

Priority under 35 U.S.C. §§ 119 and 120

- 13) ☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☒ All b) ☐ Some * c) ☐ None of:
1. ☒ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. _____.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
- * See the attached detailed Office action for a list of the certified copies not received.
- 14) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. § 119(e) (to a provisional application).
- a) ☐ The translation of the foreign language provisional application has been received.
- 15) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. §§ 120 and/or 121.

Attachment(s)

- 1) ☒ Notice of References Cited (PTO-892) 4) ☐ Interview Summary (PTO-413) Paper No(s). _____
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948) 5) ☐ Notice of Informal Patent Application (PTO-152)
- 3) ☒ Information Disclosure Statement(s) (PTO-1449) Paper No(s) 2,10,11 . 6) ☐ Other: _____

DETAILED ACTION

Election/Restrictions

1. Applicant's election with traverse of Group I (claims 1-17, and 23) in Paper No. 9 is acknowledged. Because applicant did not distinctly and specifically point out the supposed errors in the restriction requirement, the election has been treated as an election without traverse (MPEP § 818.03(a)).

Claim Rejections - 35 USC § 102

2. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

3. Claims 1-3, 5-10, 14, and 17 is rejected under 35 U.S.C. 102(b) as being anticipated by U. S. Patent No. 5,476,736 (Tanabe).

Tanabe, in col 2, lines 45-57, in col 5, lines 48-60, in col 6, lines 5-39, and in figures 4A, and 4B, discloses a method of projecting an image onto the surface of a photoresist coated wafer using a projection optical system, comprising performing a first exposure using a first mask (reference 4) to form a first optical image on the photoresist film (image partly), performing a second exposure using a second mask (reference 4) to form a second optical image on the photoresist film, wherein the first and second exposures are illuminated by an illumination beam that has a dipolar intensity distribution (see references 1, 2, and 3 of figures 4A-4B) (claims 1-3). Tanabe, in col 6,

lines 11-17, lines 25-29, and lines 46-48, discloses that the mask used for the double exposure process has sub patterns (square shapes, reference 37 of figure 6) and that the first exposure exposes the subpatterns partly to form a first optical image and the second exposure exposes the subpatterns partly to form a second optical image (claim 5). Tanabe, in col 5, lines 16-32, and lines 54-60, and in figures 3, 4A-4B, and 6, discloses that the illumination mode (beam) is used to image linear features of the pattern (see figure 6) oriented perpendicular (substantially) to an axis (reference 1 of figures 3, 4A-4B) joining the two poles of the substantially dipolar intensity distribution to form a pattern on the resist film that defines the mask sub-patterns (square shapes)(claims 6-7). Tanabe, in col 5, lines 16-56, and in figure 3, discloses that the dipolar illumination system (reference 1) comprise a general relatively weak background intensity (the beam of light is partially darkened and is reduced in light or demagnified) (claim 8). Tanabe, in col 8, lines 50-67, and in col 9, lines 1-21, discloses that between the first exposure and the second exposure the wavelength of the illumination beam is changed resulting in a change in intensity of the illumination beam used in the second exposure process (claim 9). Tanabe, in col 8, lines 29-39, and lines 46-67, and in figures 11A and 11B, discloses that the first and second exposures are in dipolar illumination mode and the axes of the two dipoles (reference 1 of figures 11A-11B) are perpendicular to the two illumination beams (mode) (reference 2) (claim 10). Tanabe, in col 7, lines 1-39, and in col 8, lines 1-19, discloses that the focus of a pattern of the substrate is adjusted (different focal planes employed at each exposure) between the first exposure and the second exposure to ensure optimal focus (very small variation or

Art Unit: 1756

fluctuation of the obtainable hole size is observed) (claim 14). Tanabe, in col 5, lines 16-67, and in figure 3, discloses a method of exposure using a projection exposure system, comprising providing a photoresist-coated (energy sensitive material) wafer, providing a mask that has a given pattern, and imaging the mask pattern onto the resist coated substrate (claim 17).

Claim Rejections - 35 USC § 103

4. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

5. Claims 4, and 23, are rejected under 35 U.S.C. 103(a) as being unpatentable over U. S. Patent No. 5,476,736 (Tanabe) in view of U. S. Patent No. 5,563,012 (Neisser).

Tanabe is discussed in paragraph no. 2.

The difference between the claims and Tanabe is that Tanabe does not disclose that the masks are exchanged between the first exposure and the second exposure (claim 4). Tanabe does not disclose that the first mask is different from the second mask (claim 23).

Neisser, in col 3, lines 8-48, discloses exchanging the first overlay mask with a second overlay mask between successive exposures, and that the first overly mask is different from the second overlay mask.

Therefore, it would be obvious to a skilled artisan to modify Tanabe by changing the first mask with a different second mask between the exposures as taught by Neisser because Neisser, in col 1, lines 58-67, discloses that successive exposures of each of the different mask images results in enhanced a) resolution and b) depth of focus.

6. Claims 11-13, are rejected under 35 U.S.C. 103(a) as being unpatentable over U. S. Patent No. 5,476,736 (Tanabe) in view of U. S. Patent Application Publication No. 2002/0109827 (Nishi).

Tanabe is discussed in paragraph no. 2.

Tanabe, in col 2, lines 45-57, in col 5, lines 48-60, in col 6, lines 5-39, and in figures 4A, and 4B, discloses a method of projecting an image onto the surface of a photoresist coated wafer using a projection optical system, comprising performing a first exposure and a second exposure, wherein the first and second exposures are illuminated by an illumination beam that has a dipolar intensity distribution (see references 1, 2, and 3 of figures 4A-4B)

The difference between the claims and Tanabe is that Tanabe does not disclose that the exposure is performed using polarized electromagnetic radiation (claim 11). Tanabe does not disclose that the polarized radiation is linearly polarized (claim 12). Tanabe does not disclose that the polarized radiation has an electric component oriented substantially perpendicular to an axis joining the two poles of the dipolar intensity distribution (claim 13).

Nishi, in [0009], [0088], [0119], [0120], and [0121], and in figure 5, discloses that the illumination beam is a linearly polarized electromagnetic radiation (UV, 248nm), and that the electric component (ILP) is split by the beam splitter and is propagated perpendicular to the axis joining the two poles of the dipolar intensity distribution.

Therefore, it would be obvious to a skilled artisan to modify Tanabe by employing the method of using linearly polarized electromagnetic radiation and propagating the polarized light through a beam splitter as taught by Nishi because Nishi, in [0123], and in [0138] discloses that employing such a method of illumination mode, the resolution corresponding to a 256M-bit DRAM can be obtained with certainty while satisfying the condition regarding the permissible range of the depth of focus regardless of the thickness of the photoresist.

7. Claims 15-16, are rejected under 35 U.S.C. 103(a) as being unpatentable over U. S. Patent No. 5,476,736 (Tanabe) in view of U. S. Patent No. 6,263,099 (Maeda et al).

Tanabe is discussed in paragraph no. 2.

The difference between the claims and Tanabe is that Tanabe does not disclose that at least one of the exposures is performed with an attenuated phase shifted mask (claim 15). Tanabe is does not disclose that the attenuation of the mask is chosen to balance the energy of radiation of the zeroth and first-order diffracted beams as they emerge from the pattern captured by a projecting system used to image the patterns on the substrate (claim 16).

Maeda, in col 21, lines 63-67, in col 22, lines 1-39, discloses that the mask used for the exposure process was of the attenuating type (attenuation filter), and that he attenuation filter was used to balance the intensity of the 0th order diffraction light and the first order diffraction light prior to imaging the pattern grid pattern.

Therefore, it would be obvious to a skilled artisan to modify Tanabe by employing a phase shifting mask as one the masks as suggested by Maeda because Maeda, in col 22, lines 19-39, discloses that balancing the 0th order diffraction light and first order diffraction light with an attenuating material enables the grid pattern of the object to be detected with high resolution and high contrast.

Conclusion

8. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Daborah Chacko-Davis whose telephone number is (703) 306-5923. If the examiner is unavailable, you may contact her supervisor, Mark F. Huff at (703) 308-2464. FAX communications should be sent to the appropriate FAX number; (703) 872-9311 for After Final Responses only or (703) 872-9310 for all other responses. FAXES received after 4:00 P.M. will not be processed until the following business day.

dcd



April 30, 2003.



**MARK F. HUFF
SUPERVISORY PATENT EXAMINER
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